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marshes. Captain Chesney places the last impediment at Kalat Geran, where there is a narrow bank of pebbles across the river, with three and a half or four feet water at the low season : 'this is the last shallow spot in the Euphrates; which, during the rest of its course to the sea, is deep, wide, and perfectly free from obstructions.' Kalat Geran appears, from Captain Chesney, to be a little above Graim or Graham ; and therefore Niebuhr's statement and his, as will appear from comparing the maps, do not entirely agree as to this part of the river.

Between Hilla and Bir no position is fixed astronomically, though the sites of Hit, Annah, Der, Racca, and some other places, are determined by various routes with tolerable precision. The reader who wishes to examine the authorities for these positions may refer to Major Rennell's Geography of Western Asia.

We are enabled, by Captain Chesney's examination of this great river, to add something to our previous knowledge, and to obtain a more precise notion of its length measured along its windings. If to the 1143 miles between Basra and Bir we add 600 more, following the river to its source along the Morad, this will make 1743 ; nor do we think the calculation in excess. The distance from Basra to the Gulf will increase the whole to about 1800 miles, in round numbers.

IV.—*Physico-Geographical Essays.* Essay I.—*Observations on Lakes;* being an Attempt to explain the Laws of Nature regarding them, the causes of their formation and diminution, the different phenomena which they exhibit, &c. By Colonel J. R. Jackson. 4to. 88 pp. Bellizard and Co., St. Petersburgh ; Bossange, London.

THIS work is the first of a Series of Essays on Physical Geography, promised by a member of the Royal Geographical Society residing at St. Petersburgh. A second, and in some degree supplementary communication, from the same quarter, ("On the Seiches of Lakes,") will be found in another part of this volume : and the following extract from the letter which accompanied that, proves that the author is indefatigable in prosecuting similar researches.

"The older inhabitants of St. Petersburgh observe now a remarkable change in the temperature of their climate,—the examples of excessive and long-continued cold being now of rare occurrence. This must, however, be understood relatively, for what is here deemed mild weather, would be regarded as most severe in England, and the river constantly freezes to a great thick-

ness with extreme rapidity. It is my intention, should nothing prevent, to make a course of observations, this winter, on the progress of the formation of the ice, and the temperature of the water under it at different depths: also, to endeavour to ascertain the cause of the singular porosity of the last ice which floats down from the Ladoga, and which seems entirely composed of short vertical rods or cylinders, easily separated."

The object of the volume immediately before us is expressed in its title:—it is to collect into one view the principal facts regarding lakes, whence to deduce the laws or circumstances by which their formation, increase, or diminution may seem to be regulated. In pursuing this investigation, Colonel Jackson arranges his materials under the following heads:—*Introduction—of Lakes in general—of Lakes without Outlet—Decrease in the Quantity of Water in Lakes—Climate of Basins—of the Affluents of Lakes—of Lakes having an Issue for their Waters—of the Temperature of Lakes—Colour and Transparency of Lakes—Quality of the Water of Lakes—of Salt Lakes—remarkable Phenomena of Lakes—of the Lakes in the Craters of extinct Volcanos;*—concluding as follows:—

" From what has been said regarding lakes, it will be evident:

" 1st, That a greater variety of objects are to be considered in connexion with them, than might have been at first apprehended; and

" 2dly, That although some of these objects may at first sight appear trifling, they are in fact all of importance, throwing light mutually upon each other; and that, consequently, nothing satisfactory can be asserted of lakes, without taking everything into consideration; they being a complicated problem, for the solution of which it is necessary to state many equations, whose terms always modify, and sometimes wholly cancel each other.

" Notwithstanding which, it is probable that some of those who consider the subject solely with a view to practical utility, may regard many observations as superfluous, which the man of science will deem, and not without reason, of peculiar interest.

" It is our wish, that lakes be considered and attentively examined under every point of view; not only in order that they may themselves be thoroughly understood, but because many of the facts connected with them have a direct, though collateral, influence upon other objects of physical geography, a science comparatively new.

" Some, I doubt not, of my readers will say, I have managed to make lakes a very dry subject, while in fact my object is to prevent their desiccation. Had I proposed to myself to speak of lakes as exhibiting some of the most engaging and picturesque scenes, with which the surface of our globe is decorated, my task would undoubtedly have been more pleasing to the many, and more easy to myself. But as I never knew a rose or lily to be less prized by

those who knew the secrets of vegetation, than by those who knew nothing of the matter; or a butterfly less admired, because its history was known: so, on the contrary, I have ever found our admiration to be increased for the objects of creation, in proportion as we become initiated into their mysteries. I am therefore persuaded, that he, who, skimming over the surface of the Lavian lake, is lost in ecstasy, while his ravished sight wanders over the varying beauties of the surrounding scene, is so far from having any portion of his delight diminished by a scientific knowledge of all the circumstances connected with the subject, that he feels it thereby greatly enhanced. If lakes charm us by their beauty, and interest us by their utility, they call forth our gratitude to the Source of all beauty, the Giver of every benefit; and when we contemplate those admirable laws of nature, by which that beauty and those benefits are secured to us, we are elated with wonder and adoration.

" Whether lakes present the gloomy aspect of Averno, the heart-enlivening scenes of Verbanus with its enchanted islands, or a dreary waste of flat and shrubless shores, these reservoirs are alike useful and important in the system of the earth. Rains do not always fall, and but for reservoirs, rivers, those arteries which preserve the life of the world, would have but a transient and occasional circulation. But all rivers are provided with reservoirs or lakes; many it is true are hidden in the bosom of the mountains, but many more are at the surface of the earth: thus most rivers take their rise in lakes, nor is this their only use. Extent of surface is necessary to evaporation, and thus water is spread into sheets to rise in embryo clouds, around which collect the floating vapours dispersed in air—to form a screen from the sun's too-parching rays—to dissolve in showers and irrigate the land—and to replenish the exhausted sources of running waters. Such services, rendered to us by means of lakes, would be alone sufficient to excite our interest, but other benefits yet accrue from them.

" Some are of great extent, they are inland seas, on which are wafted from far distant points the various productions of different soils, the different produce of various industry: nay more, they themselves teem with riches. Their fisheries are important; their salts, of extensive utility. Such then are lakes; and such, but from extraneous causes, they would remain.

" We have seen, however, that lakes are perpetually diminishing; some are already dried up. To delay therefore an event which for many countries would prove a dreadful calamity, is surely an object worthy of serious consideration. It might be thought, that no human ingenuity can prevent the desiccation of lakes. But we make bold to assert, that, upon an attentive consideration of the facts contained in this essay, useful hints may be derived for the means to be employed.

" Thus, whatever tends to dry up sources, to loosen the soil of mountains, to increase evaporation, to enlarge outlets, &c., tends directly to the prompt desiccation of lakes; and hence all means,

which may be devised for preventing these tendencies, favour their reverse, and act as preservatives to lakes.

“ Nor should it be falsely imagined, that, as the operation is slow, its final result is too distant to be worthy of our regard. The operation is slow, it is true, but not so slow as may be imagined. We have shown in this essay, that a constantly similar extent of surface is no sign of a constantly equal quantity of water; the surface remains the same, but the depth diminishes; hence the danger is not apparent. Let lakes be but regularly sounded every ten years, in all their parts, and then perhaps many provinces, now happy, and now secure of the perpetual enjoyment of their present blessings, will have just cause for alarm. A few generations may convert the now beautiful Lake of Geneva into a pestilential swamp, or dwindle it down to a capricious torrent river. Lake Erie itself, the boast of the United States, has already worn back its outlet at the falls, seven miles! twice as many more, and it will fall to the level of Lake Ontario. To effect this, the work of many centuries will be perhaps requisite; and even then the lake may remain of great extent and of long duration, as the waters it receives by its principal affluent are purified by deposition in the higher lakes.

“ These lakes are seas of fresh water, and the world itself may be changed ere they dry up. It is not, therefore, to such immense bodies of water that our observations are directed; they are beyond our control,—for what barrier of human fabric could resist, when mountains wear away? But smaller lakes may be managed; and when it is remembered, that canals, in many cases, with all their advantages, are indebted to lakes for their existence, it becomes doubly important to take into consideration every circumstance which may affect them.

“ In like manner, we trust, that from what we have said concerning salt lakes, the intelligent will be able to devise means by which the advantages of such lakes may be secured or increased, and their products varied. For instance, in the case of a lake, the waters of which are too little impregnated with salt to be worth the expense of evaporation, on account of the small quantity of salt derived from the subaqueous springs, and of the large quantity of water discharged through the outlet, the reservoir may be made the source of considerable wealth, by damming up the lake, and thus increasing the surface exposed to evaporation, while the salt is prevented from escaping.

“ Again, should natron be required, and that substance be proved to be the produce of a spontaneous decomposition of the muriate of soda by the carbonate of lime, it may in some cases be obtained by a canal, which shall drain off the water of the lake into natural or artificial hollows in a calcareous soil, &c.

“ Lastly, as we before observed, the different circumstances which are connected with lakes, are also linked with other objects, whence much light may be thrown upon these by observing those: and even should no other benefit result, which is however far from being the

case, it is in our opinion a sufficient incentive to research, to learn the several laws by which nature operates the various changes necessary to the harmony of her existence.

" We shall therefore conclude, by recommending to all travellers and naturalists, whose pursuits or inclination lead them to a contemplation of nature, to examine lakes and the phenomena which they present. The objects to be considered may be summed up in a general manner, under the following heads:—

1. Geographical and Topographical situation.
2. Height above the level of the sea in English feet.
3. Length in British miles of sixty to the degree.
4. Depth in English feet.
5. The water { Temperature, according to Fahrenheit.
Colour and Transparency.
Quality and Analysis.
6. Affluent streams and springs . . { Name and Importance.
Quality and Quantity of water, and the detritus which they furnish.
Temperature at their Ingress.
7. Outlets . . { Ancient or Modern.
Dimensions and quantity of the water which they carry off, and whether clear or troubled.
Temperature at the Egress.
8. Climate and soil } At the bottom ; and
of the basin } at different heights.
9. Prevailing wind.—Direction, quality, and duration.
10. Evaporation and } Its Quantity, as deduced from all the cir-
Infiltration } cumstances which can affect it.
11. Particular phenomena.
12. Remarks.—Ascertained diminution, &c.

" Under these general heads may be arranged almost all the observations which it is desirable to make on the subject of lakes ; and we repeat, that if all lakes of any note were carefully examined, under every point of view, and such examinations renewed after every five or ten years, much curious and useful knowledge would be procured to us, on a subject more important than is generally believed.

" It is the want of such observations which prevents our Essay from being as complete as we could wish it. We also confess our inability, under any circumstances, to do full justice to the subject. If, however, we shall have succeeded in drawing the attention of the scientific to this important branch of physical geography, and in creating an interest in its investigation, we shall not regard our effort as vain ; and trusting the subject will be taken up by abler hands, we now dismiss it, having done our best, and soliciting indulgence in favour of our motive."
